

Spectrum-64

Telecommunication Software

Version ZX-4.1



USER GUIDE

TECHNICAL MANUAL

for the

ZX SPECTRUM

and

**ZX ROM EMULATED
COMPUTER**

Grey & Clifford Computer Products

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SPECTERM-64
TERMINAL SOFTWARE

USER GUIDE AND TECHNICAL MANUAL

VERSION 4.1

FEATURING:

64 COLUMN DISPLAY
UPPER/LOWER CASE W/CAPS-LOCK
XMODEM PROTOCOL FILE TRANSFERS
31+K BUFFER CAPACITY
300/1200 BAUD CAPABILITY
FULL SCREEN COLOR CONTROL
2050 MODEM OR RS-232C I/F

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INTRODUCTION

First, we wish to thank you for selecting SPECTERM-64 as your choice in TELECOMMUNICATION SOFTWARE. You have made an excellent choice. SPECTERM-64 has features not available in any other terminal software package for the Timex/SINCLAIR 2068 Personal Color Computer. It can be used to connect the Timex/SINCLAIR 2068 direct to a main computer or via any modem to "talk" to a Micro User or main computer over the telephone lines. It allows you to send and receive messages to bulletin boards and commercial databases. Some systems allow you to download or upload programs as well. SPECTERM-64 also allows you to transfer programs and data between yourself and other users. When the correct version of machine code is loaded (see OVERLAY LOADER section) it will work with most of the commercially available hardware based RS-232C interfaces and is unique in the fact that it can be customized to suit any others that appear.

SPECTERM-64 is not an MTERM II clone.

This software is a unique terminal program that is easy to use. Most commands require only two keystrokes to accomplish. This manual has been written (and rewritten) to help familiarize you with the functions and capabilities of SPECTERM-64. It is suggested that you take a few moments to read through this users guide. Answers to the most often asked questions are in this document along with technical information for the hackers among you. If you have a question or need information regarding SPECTERM-64, that is not provided, G & C COMPUTER PRODUCTS will gladly assist you. Our address and phone numbers are listed elsewhere.

FIRST TIME USE of SPECTERM-64

Your SPECTERM-64 Software is recorded 'twice' on quality cassette tape and includes THIS user guide/technical manual. Side 'A' contains the 'SPECTERM-64 OVERLAY LOADER', 'SPTERM' machine code, and several I/F overlay files. Side 'B' contains additional versions of the 'LOCAL CONTROL MENU'. Select your particular I/F from the menu provided.

USING THE SPECTERM-64 OVERLAY LOADER

NOTE...

If you are using the SPECTRUM version of SPECTERM-64, configure your T/S2058 for SPECTRUM emulation. (SPECTERM-64 will operate with any SPECTRUM ROM, ROM-SWITCH or other 'emulator'.)

You must attach your desired communications interface following the manufacture's instructions.

Load the SPECTERM-64 OVERLAY LOADER program from side 'A' using the command; LOAD"". Be prepared to STOP the tape when prompted. Then type in the type of interface you are using. Press <ENTER> and start the tape to load the machine code and required overlay. The program will then stop at a 'LOCAL CONTROL MENU'. At this menu your options are:

1-SAVE COPY (This will SAVE a copy of SPECTERM-64 to a 'work tape' ready for use).

2-RUN (This will RUN SPECTERM-64.)

NOTE: DIAL PHONE and wait for 'tone' from the remote computer BEFORE pressing <ENTER> if using the 2050 Modem.

3-EXIT to BASIC

4-DISCONNECT (2050 modem only.)

Side 'B' of the tape contains two more examples of 'LOCAL CONTROL MENUS'. They give SPECTERM-64 additional capabilities such as changing 'parameters' and baud rates. Viewing/printing the buffer and buffer stats, etc. are examples of routines that can and should be tailored to your liking.

After SPECTERM-64 is configured for your interface, ENTER '3' from the LOCAL CONTROL MENU to STOP the program, flip tape to side 'B' and LOAD "LOADER" (for Z-SI/O), or LOAD "LD2050" (for the 2050 Modem). After the software LOADs, enter GOTO 1500 which will bring up the new 'LOCAL CONTROL MENU'. To make a copy of SPECTERM-64 with this menu, Exit to BASIC ('3' from MENU) and enter GOTO 1000.

The BASIC area in SPECTERM-64 is approximately 7K in size. This area is available to use for any routines that you may want to include there. This concludes the installation procedures. As additional I/F overlays become available they will be posted on the TIME--<X>--CHANGE BBS (213) 329-3922 for downloading FREE OF CHARGE. SPECTERM-64 Public Domain files and On-Line support is available 24 Hours a Day here too.

RUNNING SPECTERM-64

SPECTERM-64 runs, the introduction screen lists information about the software like the version and serial number, release date and copyright. Pressing the <ENTER> key again will place you in 'TERMINAL MODE'. To EXIT terminal mode and return to BASIC, press CAPS-SHIFT 1 (EDIT) then the SPACE BAR. Respond to "RETURN TO BASIC?" by pressing the 'Y' key. This will return you to the 'LOCAL CONTROL MENU' or any functions you have chosen to have in your BASIC area.

The prompt <<LCXRT>B at the top-right of the screen will indicate whether Line feeds (L) which are unnecessary with this program, Control characters (C) which are rejected by SPECTERM-64 or an X-OFF (X) will illuminate if a CONTROL-S is sent by the remote computer to stop input while it does other things. It will go off when the computer returns to talk to you. The (R) and (T) indicate the Receive or Transmit mode (for XMODEM file transfer).

To enter commands press the 'CAPS SHIFT' key and the '1' key together (EDIT). The 'RET,SPA, ,O,E,B,R,T,L,S,C' prompt will then appear at the top of the screen.

REMEMBER! ALL software commands MUST be in CAPITALS, so select UPPER case before using. Upper/Lower case characters can be selected by using the 'CAPS SHIFT' and '2' key (CAPS LOCK).

When using the WC-2050 MODEM you MUST MANUALLY DISCONNECT (Turn Off carrier tones). This can only be done from BASIC, either from within a 'LOCAL CONTROL MENU' or an IMMEDIATE MODE command of:

OUT 119,0

SPECTERM-64 COMMANDS and their functions:-

- E - Toggles between HALF and FULL DUPLEX (ECHO). This is normally OFF, as keyboard characters are echoed back by the database.
 - B - Stores all printed characters in the memory buffer, destroying any program already there. It can be turned ON and OFF at any time without destroying what TEXT has already been stored. When ON the "B" will flash at the top of the screen.
 - O - Will send an ASCII TEXT file loaded from tape as if it came from the keyboard and will STOP upon reaching a character with a CODE value greater than 127 (i.e. a graphic character).
 - L - Will load any program (BASIC or BYTES file) from a cassette into the memory buffer ready for sending, re-SAVEing or printing.
 - S - Will save the program in the memory buffer to tape as a BYTES file or BASIC file (depending on type). TEXT files can be saved this way also (see TEXT section). Remember to START tape BEFORE pressing 'S'.
 - T - Will send the program in the memory buffer to the remote system using XMODEM checksum protocol. This is the protocol used by most bulletin boards as it allows error checking and the transfer of machine code as well as printable character or text files (ASCII).
 - R - Will receive a file into the memory buffer using XMODEM protocol as stated above. The 'R' will flash as blocks of data are successfully transferred. Note: SPECTERM-64 will not return to TERMINAL MODE unless a file has been successfully transferred. The only way to break out is to press the SPACE bar REPEATEDLY.
 - C - Will allow you to send a control character from A to Z by pressing the key required after the prompt at the top of the screen. CONTROL characters from 27 to 31 may be generated by using the keys 6 to 9. This includes the ESC character 27.
- ENTER Will return you to TERMINAL MODE from the function command menu. ('RET' is the <ENTER> key on the T/S2068.)
- SPACE Will allow you to return to BASIC after pressing key 'Y' at the question "RETURN TO BASIC?"

HANDLING TEXT

SPECTERM-64 was written to allow the end user to configure the program to his (or her) specific needs. There are text handling capabilities built in to the software and others that can be added (into the basic area) if desired.

First, several of the functions at the main menu are usable for handling text files. You get to the main menu (from terminal mode) by pressing CAP SHIFT/ 1 (EDIT). Remember, ALL COMMANDS MUST BE ENTERED IN CAPS. UPPER/lower case can be toggled by using CAPS SHIFT/ 2 (CAPS LOCK). The commands usable with text are:

B: Toggles the buffer open/close. When opened the "B" in the main menu will flash and the buffer will capture all text printed on the screen (up to 31.487K). The buffer can be toggled without destroying previously stored text. Using the buffer to capture text will destroy any program already stored.

O: Will transmit a BYTES file that was loaded from tape or other mass storage system, as if it were being entered from the keyboard. Transmission will stop when the file comes to a character whose code is greater than 127 (any graphic). This function allows you to send a text file as ASCII, therefore you could create a file in Tasword II (ending it with a graphic character), load it into SPECTERM-64 and upload it as ASCII.

L: Will load ANY tape (including Tasword II text files) from cassette into the SPECTERM-64 buffer, ready for sending.

S: Will SAVE the program or text file, downloaded into the buffer, to tape. The file will be save as a BYTES file or BASIC file automatically. If file is text (captured using an open buffer), the file will be saved to tape using the filename "TEXT.CODES". You must start your tape recorder BEFORE using the "S" command. SPECTERM-64 text files can be loaded directly into Tasword II for editing.

T: Will transmit any file (including text) in the buffer to a system that uses Xmodem protocol.

R: Will receive any file (including text) into the buffer from any system that uses Xmodem protocol. You should not save a text file downloaded this way with the "S" command. Save these files from Basic with the procedure outline below.

SPACE: Will allow you to return to Basic after pressing "Y" in response to "RETURN TO BASIC?".

ENTER: Press "Enter" to abort from main menu back into terminal mode.

PEEKs and POKEs and other secret formulas....

The following are options that you may add into the Basic area of SPECTERM-64. They are very useful if you intend to do much text handling.

The addresses 32130, 32131, and 32132 should be POKEd with 0 if you don't want to reset (empty) the buffer upon entering (RAND USR 30806) the SPECTERM-64 terminal mode. These addresses are normally set at 34, 96, and 120 respectively.

Use DEF FN P(X)=PEEK(X)+PEEK(X+1)*256 to make it easier to find the values of the 2 bytes needed for the addresses (X and X+1). If needed, see Spectrum or T/S2068 manual for explanation of the DEF FN and FN functions of the computer. These functions simplify the data handling (text included) and allow the use of non-supported peripherals (Disks, Microdrive, etc.) with SPECTERM-64.

After entering the above FN function, FN P(30814) is the buffer start address. FN P(30816)-FN P(30814) will give you the length of buffer used. Therefore to SAVE a text file, to tape, that was D/L with Xmodem (the "R" function), exit to Basic then use:
SAVE "<filename>"CODE FN P(30814),FN P(30816)-FN P(30814).

To re-transmit a text file using the "O" command, that was downloaded with the "B" command (and not saved and reloaded from tape), POKE FN P(30814),3.

Any of these functions and many others could be added to the Basic area of SPECTERM-64. When you have designed YOUR favorite Basic area, upload it to the SPECTERM-64 support area on the TIME--<X>--CHANGE BBS (213-329-3922) to share with the other SPECTERM-64 users.

When SAVEing TASWORD files to LOAD into SPECTERM-64, make a note of the code length. It is necessary to POKE this value into SPECTERM-64 as described on page 8 of this manual. This will allow TASWORD files to be sent as TEXT files, but no CR characters will be sent as TASWORD-II only inserts them upon printing a file.

For users who run TASWORD-II on the ZX Microdrives....

To save a file to microdrive with CR's add the following to TASWORD-II's BASIC....

```
251 INPUT T$:OPEN#3;"m";1;T$
```

and to line 290 CLOSE#3 before GOTO 10

AUTO CR/LF FUNCTION:-

SPECTERM-64 is set for systems that allow only a Carriage Return (CR) that is not followed by the Line Feed character (LF). If however you wish to send a (LF) after each line (say for talking to another user) then you may POKE 33649,0 to enable this function. For NO line feed POKE 33649,201 (default value).

MICRODRIVES, DISC DRIVES and storage other than cassette:-

A VERY HANDY FORMULA...

DEF FN P(X)=PEEK(X)+PEEK(X+1)*256 as FN P(X) gives the value of the two bytes making up the addresses (X AND X+1).

Not only is this formula used by the 'LOCAL CONTROL MENU' to keep track of buffer status and the 'end-of-file' for the simple 2040 printer routine it can be used to construct SAVE/LOAD routines for most any type of mass storage system you may wish to employ. The following are some example routines that could be added to the 'LOCAL CONTROL MENU' for your system.

ALWAYS REMEMBER to...

POKE addresses 32130/1/2 with 0 before LOADING the buffer from BASIC. This prevents the buffer from being reset (cleared) on entering SPECTERM-64.

Example using ZX Microdrive syntax...

To LOAD code into the buffer use:

LOAD*"m";1;"filename"CODE FN P(30814)

You must POKE the "CODE file length" into 30816 and 30817.

(See example on page 9.)

To SAVE code that is in the buffer use:

SAVE*"m";1;"filename"CODE FN P(30814),FN P(30816)- FN P(30814)

These contain the start of the buffer after the keyword CODE and after the comma gives the length of the code.

WHY....

When you use the 'L' (LOAD) command from inside SPECTERM-64 to LOAD a file from tape, SPECTERM-64 automatically calculates this for you. SPECTERM-64 obtains this data by reading the tape header. However if you are using a mass storage system, (MICRODRIVE, DISC) the routine described below and on the following page supplies SPECTERM-64 with the information it needs to transmit a file that has been LOADED into the buffer from a source other than cassette. The XMODEM routine in SPECTERM-64 needs to know the LENGTH of the file present in the memory buffer and WHERE in the buffer it is located. Without this information SPECTERM-64 will assume the buffer is 'empty' and will fail to properly transmit the contents of the buffer.

HOW....

Poke the 'SUM value' of the LENGTH of your file + the BUFFER START ADDRESS into address locations 30816 and 30817.

(30817 is POKED with the "high byte" value) to be transmitted via XMODEM. You can find the start of the buffer with FN P(30814).

A WORKING MODEL....

The following is an example routine that you could add to your "LOCAL CONTROL MENU" and customized to suit your mass storage system syntax.

EXAMPLE:

```
10 INPUT "Enter CODE LENGTH":CL
20 LET RCL=CL
30 IF INT(CL/128)<>CL/128 THEN LET CL=(INT(CL/128)+1)*128
40 LET HCL= INT ((CL+FN P(30814))/256)
50 LET LCL= (CL+FN P(30814))-HCL*256
60 LOAD [your system syntax]CODE FN P(30814)
70 POKE 30817,HCL:POKE 30816,LCL
80 IF CL>RCL THEN FOR F=34048+RCL TO 34048+CL:POKE F,0:NEXT F
90 GOTO 1500 <--- jump back to menu
```

VARIABLES USED:

CL = CODE FILE LENGTH.
HCL = "HIGH BYTE" OF THE CODE LENGTH.
LCL = "LOW BYTE" OF THE CODE LENGTH.
RCL = 'RE-CALCULATED' CODE LENGTH.

SPECTERM-64 TECHNICAL DATA

These addresses are where SPECTERM-64 jumps to when it communicates with the interface hardware (i.e. the 'overlay'). Data to be processed is in the 'A' (accumulator). All other registers are preserved. If writing a routine for your own interface you would use these as the start address for these routines. If more room is needed you can place 'jump/ret' instructions here to another portion of memory. But do not make your routines too long or characters may be lost at high speed due to processing time. The address at 'INIT' is run on entering SPECTERM-64 and initializes the interface.

INPUT	33872	+5 Bytes
OUTPUT	33889	+5 Bytes
RX/STAT	33877	+6 Bytes
TX/STAT	33883	+6 Bytes
INIT	33894	<-- Length depends on hardware used.
	to	
	34047	<-- Must NOT exceed 34047.

LAST available ADDRESS = 34047

Buffer start = 34048

Specterm-64 CODE START = 30806 LENGTH = 3242

POKES FOR "HC2053" and "2050zx" and "2-S1/D" overlays....

The following POKES will change the interface parameter settings. Interface overlays 'default' to 8/1/none and MUST be 8/1/none for XMODEM transfers. POKE address,value.....

30809,111	=	8/1/none	at	300	baud
30809,123	=	7/1/even	at	300	baud
30809,110	=	8/1/none	at	1200	baud
30809,122	=	7/1/even	at	1200	baud
30809,74	=	7/1/odd	at	1200	baud
30809,75	=	7/1/odd	at	300	baud
30809,62	=	8/2/none	at	1200	baud
30809,63	=	8/2/none	at	300	baud

SCREEN COLOR CONTROL....

The screen PAPER/INK and BORDER colors can be changed with the following POKES.

Main screen	30829,x	x = (8 * PAPER + INK)
Status line	30830,x	x = (8 * PAPER + INK)
Border	30828,y	y = (8 * color)
Border	30831,c	c = color (0 thru 7)

KEYBOARD SENSITIVITY....

The keyboard scan rate can be adjusted if needed by POKEing the following address.

POKE	32520,t	t = Any number from 1 to 255
		the 'default' value is 150.

AUTO X-OFF/X-ON....

SPECTERM-64 automatically sends an X-OFF (Control-S) when the main menu is selected (EDIT) from TERMINAL MODE and an X-ON (Control-Q) is sent when TERMINAL MODE is resumed. Some remote systems may not respond properly to control codes that you may wish to send without first disabling this function. The addresses are...

X-ON = 30833,17 and X-OFF = 30832,19
To disable POKE with 0, 13 or 64 as desired.

XMODEM ACK/NAK and BLOCK handshake TIMING.....

NOTE: These values are properly set for both 'direct connect' and packet switching networks and should not need to be changed.

33599	=	Rx'R CHR timeout (1)
33547	=	Rx'R BAD BLOCK timeout (1) relaxed to 5
33395	=	Rx'R INIT ACK timeout (3) relaxed to 5
33212	=	Tx'R INIT ACK timeout (65)

There is no timeout for Tx'R CHR or BLOCK.

HINTS & KINKS for SPECTERM-64

If you have never used 'XMODEM' or 'KMD' for file transfers before here is a quick how-to with SPECTERM-64....

Most Bulletin Board Systems (BBS) have facilities for the transfer of 'binary' files. The most widely used 'protocol' is called XMODEM. Another "new" version is called KMD but it too uses XMODEM protocol for file transfer. The only differences between the XMODEM and KMD programs is that KMD allows 'bulk' file transfers. To initiate a transfer with KMD or XMODEM and SPECTERM-64 simply do the following:

On 'RCP/M' systems (and this covers 90% of the systems you will find) after you have gained access to the CP/M system you will see a CP/M command prompt that will look like this:

RO>_ (the underline '_' is your cursor.)

To SEND (upload) a file TO this system FROM your computer you would enter:

XMODEM RC FILENAME.TYP (Then hit <ENTER>)

The 'R' tells XMODEM to RECEIVE, the 'C' tells XMODEM that you are using 'CHECKSUM' protocol (XMODEM uses two types of protocols, CRC which is 'Cyclic Redundancy Check' and 'CHECKSUM' SPECTERM-64 uses CHECKSUM protocol.), the 'FILENAME' is the name that you have given your file and should be no longer than 8 characters and the '.TYP' is the file TYPE identifier that tells other users what the file is. (.TXT is a text file, .DOC is a documentation file. If the file you are sending is a program file for your computer you would use to identify it. This varies depending on how the SysOp (System Operator) wants his system organized. Ask if you are not sure... (On the TIME==<X>==CHANGE (213) 329-3922 we use several for the Timex machines because some are for the TS-2068 and some are for the SPECTRUM and still others are for the TS-1000/1500.... To identify an XMODEM file sent by SPECTERM-64 we use: 'filename.SPX'. Now back to XMODEM...

After you hit <ENTER> as stated above XMODEM will identify it's self something like this:

RO>XMODEM RC FILENAME.TYP <-you entered this

XMODEM v11.7 - 09/08/85
(Checksum protocol selected)
Receiving BS:FILENAME.TYP
3420K available for uploads
File open - ready to receive
To cancel: Ctrl-X, pause, Ctrl-X

NOW you should press your CAP-SHIFT and 1 keys (EDIT) then hit the 'T' key. XMODEM and SPECTERM-64 will now 'sync-up' and the transfer will take place AUTOMATICALLY... there is nothing else for you to do but wait... SPECTERM-64 will return you to TERMINAL MODE after the transfer is complete! If you are running SPECTERM-64 with the WC2050 Modem you will be lacking the capability to 'see' the transfer take place. SPECTERM-64 was written for use with an RS-232 interface and a 'stand-alone' modem, most of which have 'status' indicators that allow you to visually monitor the transfer of data.

To RECEIVE a file with XMODEM and SPECTERM-64 is done the same way except the commands are slightly different. For instance, to download a file you would first get to the location of the file you want (this will vary depending on how the SYSOP has his or her system arranged) on the TIME<X>CHANGE you use the 'GOTO' command:

```
AO>GOTO UPLOADS (and hit <ENTER>)
```

```
B5> <-note the 'DRIVE & USER' has changed. If you wanted to see what files are here you would now enter the 'DIR' command but we are going for the one we just uploaded....
```

```
B5>XMODEM S FILENAME.TYP ....and hit <ENTER>
```

```
XMODEM v11.7 - 09/08/85
```

```
Sending: FILENAME.TYP
```

```
File size: 64 records (8k)
```

```
Send time: 1:20 at 1200 baud
```

```
To cancel: Ctrl-X, pause, Ctrl-X
```

Now you press your CAP-SHIFT and 1 keys (EDIT) and hit the 'R' key. The 'R' in the upper-right corner of your screen will 'flash' on and off in sequence with each block of data your system receives and SPECTERM-64 will place you back into TERMINAL MODE after the transfer is complete. You now have data in the buffer and you should SAVE it to what ever mass storage you are using. Use the 'S' command to SAVE to tape.

Using 'KMD' is the SAME as XMODEM.

DROPPING CHARACTERS when running at 1200 BAUD?

This may happen on some systems!

The system you log on to USUALLY has a remedy just for this condition. As soon as the modem 'connects' some systems will ask you: "HOW MANY NULLS DO YOU NEED? (0-9):" If you experience randomly dropped (or lost) characters on your screen you should 'ask' for nulls. Again, depending on the software the SYSOP is running will determine where this command is located. Some systems have the "NULL SELECT" command in the main menu. Lost characters on the screen WILL NOT affect XMODEM transfers. How many should you choose? Well as many as you need. We suggest you start with 5 or 6 nulls.

Working with the WC-2050 MODEMS....

When using the WC-2050 modem with SPECTERM-64 you may experience a 'locked-keyboard' after a remote system has disconnected or dropped it's carrier (tones) with you. After logging-OFF of a remote system you should IMMEDIATELY RETURN to BASIC (your 'LOCAL CONTROL MENU') and DISCONNECT the WC-2050. DO NOT type on the KEYBOARD except to bring-up the 'RETURN TO BASIC?' command and the 'Y' (yes) to exit TERMINAL MODE. If you type any other keys (two is all it takes) you will 'lock-up' the keyboard and be stuck in TERMINAL MODE! The only way out of this is to SHUT OFF the computer and RE-LOAD SPECTERM-64. Or (this may or may not work with your phone) pick-up the phone you have connected to the WC-2050 and make a "noise" into the mouth piece. This may 'un-lock' the keyboard so you can re-gain control again. Use 'S' command BEFORE disconnecting from the remote system whenever possible.

For the hardware buff, here's the reason why....

The Westridge TS-2050 MODEM is a 'unique' specimen to say the least. It is 'logically' a UART (serial interface) with a 'dumb' modem attached. When a 'dumb' modem is 'off-line' (not receiving a carrier tone from the remote system) it 'tells' the UART so by the use of 'hand-shake' lines. If you were to look at a schematic or pin-out diagram of any UART you will find pins marked with names like 'DTR', 'RTS', 'CTS' ect... These are 'hand-shake' and control lines. When the WC-2050 is 'off-line' it pulls the 'CTS' line HIGH (a logic '1') to 'tell' the UART to "stop sending me Data, I'm BUSY" which the UART throws up a 'STATUS-FLAG' that 'tells' the computer to stop sending Data. SPECTERM-64 was written specifically for use with a SERIAL (RS-232) INTERFACE with a 'DUMB' or 'SMART' modem attached. The 'logical' difference between a 'normal stand-alone' DUMB modem and the WC-2050 is that when the DUMB modem is 'off-line' it still allows Data to be accepted from the UART even though it is not 'talking' to anything. Some dumb modems DO use the CTS line but these are the more expensive models that usually have 'self-test' modes with 'AL' and 'DL' (Analog and Digital 'loop-back') test modes. When in one of these 'test-modes' the modem pulls the CTS line 'LOW' thus allowing the Data sent TO the modem to be echoed back to the screen and the UART will not flag the computer to stop sending Data and "lock-up" the keyboard after the UART's 2-byte Data buffer is full.

ONE STEP FURTHER....

If you are interested in what makes your WC-2050 really 'tic' here is where you will find it....
For the MODEM portion of the WC-2050 contact

MOTOROLA SEMICONDUCTOR Products Inc.

3501 Ed Bluestein Blvd.

Austin, Texas 78721

And ask for APPLICATION NOTE AN-891

GREY & CLIFFORD
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P.O. Box #2186
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BACK-UP COPIES FOR YOUR OWN USE IS ENCOURAGED

Grey & Clifford Computer Products have invested time and money to bring this SPECTERM-64 terminal software to the T/S2068 users. It is both unfair and illegal to make copies, other than for back-up. HOWEVER, if someone you know CANNOT wait to order a copy, send \$20.00 to G & C Computer Products along with the name and address of the new owner. We will send you the latest documentation and add your name to our list of registered owners. This will allow us to keep all SPECTERM-64 users informed of new developments and "FAIR IS FAIR".

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